Amendments to the Claims

1. (*Currently Amended*) Method for transferring chips ~~(42)~~ from a wafer ~~(44)~~ to a lead frame ~~(50)~~, the method comprising the steps of:

[[-]] positioning a wafer ~~(44)~~ with chips surfaces extending in a first plane ~~(2)~~;

[[-]] positioning a lead frame ~~(50)~~ with a bond surface thereof extending in a second plane ~~(4)~~ which is at a first angle ~~(α)~~ of between 0° and 180° to the first plane ~~(2)~~, the first plane and the second plane intersecting at an intersection line ~~(8)~~;

[[-]] providing a rotatable transfer assembly ~~(12, 16, 18; 32)~~ with at least two transfer heads ~~(14; 40a, 40b, 40c, 40d)~~, the transfer assembly having an axis of rotation ~~(10a, 10b, 10c)~~ which extends in a third plane ~~(6)~~ at half of the first angle ~~(α)~~ to the first plane ~~(2)~~ and the second plane ~~(4)~~, respectively, the axis of rotation extending at a second angle ~~(β)~~ of at least 0° and at most 90° to said intersection line ~~(8)~~;

[[-]] picking up a first chip ~~(42)~~ from the wafer ~~(44)~~ by one of the transfer heads ~~(14; 40a-40d)~~ in a chip pick-up position, while bonding a second chip to the lead frame ~~(50)~~ by another one of the transfer heads in a chip bonding position;

[[-]] transferring the first chip ~~(42)~~ by said one of the transfer heads from the chip pick-up position to the chip bonding position; and

[[-]] bonding the first chip ~~(42)~~ on the lead frame ~~(50)~~ by said one of the transfer heads ~~(14; 40a-40d)~~ in the chip bonding position, while picking up a third chip from the wafer ~~(44)~~ by another one of the transfer heads in the chip pick-up position.

2. (*Currently Amended*) Method according to claim 1, characterized in that the transfer heads ~~(14; 40a-40d)~~ are rotatable essentially along one circle ~~(20)~~ in a fourth plane at right angles to the axis of rotation ~~(10a-10c)~~ of the transfer assembly ~~(32)~~.

3. (*Currently Amended*) Method according to claim 2, characterized in that the transfer heads ~~(14; 40a-40d)~~ are spaced regularly along said circle ~~(20)~~.

4. (*Currently Amended*) Method ~~according to any of claims 1-3,~~ according to claim 1, characterized in that the first angle ~~(α)~~ is 90°.

5. (*Currently Amended*) Method ~~according to any of claims 1-4,~~ according to claim 1, characterized in that the second angle ~~(β)~~ is 0°.

6. (*Currently Amended*) Method ~~according to any of claims 1-5,~~ according to claim 1, characterized in that the number of transfer heads ~~(14; 40a-40d)~~ is four.

7. (*Currently Amended*) Method ~~according to any of claims 1-6,~~ according to claim 1, characterized in that the transfer assembly ~~(12, 16, 18)~~ is rotated in one direction.

8. (*Currently Amended*) Apparatus for transferring chips ~~(42)~~ from a wafer to a lead frame, comprising:

[[-]] a wafer-positioning device for positioning a wafer (44) with chips surfaces thereof extending in a first plane ~~(2)~~;

[[-]] a lead frame positioning device for positioning a lead frame ~~(50)~~ with a bond surface thereof extending in a second plane ~~(4)~~ which is at a first angle ~~(α)~~ of between 0° and 180° to the first plane ~~(2)~~, the first plane and the second plane intersecting at an intersection line ~~(8)~~;

[[-]] at least one rotatable transfer assembly ~~(12, 16, 18; 32)~~ comprising at least two transfer heads ~~(14; 40a, 40b, 40c, 40d)~~ for picking up a first chip ~~(42)~~ from the wafer ~~(44)~~ by one of the transfer heads in a chip pick-up position, while bonding a second chip to the lead frame ~~(50)~~ by another one of the transfer heads in a chip bonding position; transferring the first chip by said one of the transfer heads from the chip pick-up position to the chip bonding position; and bonding the first chip on the lead frame by said one of the transfer heads in the chip bonding position, while picking up a third chip from the wafer by another one of the transfer heads in the chip pick-up position,

[[-]] a transfer assembly motor for driving the rotatable transfer assembly about an axis of rotation ~~(10a, 10b, 10c)~~ which extends in a third plane ~~(6)~~ at half of first angle ~~(α)~~ to

the first plane ~~(2)~~ and the second plane ~~(4)~~, respectively, and the axis of rotation extending at a second angle ~~(β)~~ of at least 0° and at most 90° to said intersection line ~~(8)~~.

9. (*Currently Amended*) Apparatus according to claim 8, characterized in that the transfer heads ~~(14; 40a-40d)~~ are rotatable essentially along one circle ~~(20)~~ in a fourth plane at right angles to the axis of rotation ~~(10a-10c)~~ of the transfer assembly ~~(32)~~.

10. (*Currently Amended*) Apparatus according to claim 9, characterized in that the transfer heads ~~(14; 40a-40d)~~ are spaced regularly along said circle ~~(20)~~.

11. (*Currently Amended*) Apparatus ~~according to any of claims 8-10,~~ according to claim 8, characterized in that the first angle ~~(α)~~ is 90°.

12. (*Currently Amended*) Apparatus ~~according to any of claims 8-11,~~ according to claim 8, characterized in that the second angle ~~(β)~~ is 0°.

13. (*Currently Amended*) Apparatus ~~according to any of claims 8-12,~~ according to claim 8, characterized in that the number of transfer heads ~~(14; 40a-40d)~~ is four.

14. (*Currently Amended*) Apparatus ~~according to any of claims 8-13,~~ according to claim 8, characterized in that the transfer assembly ~~(12, 16, 18)~~ is rotated in one direction.

15. (*Currently Amended*) Apparatus according to claim 8, characterized in that each transfer head ~~(14; 40a-40d)~~ comprises a collet ~~(66a-66d)~~ which, in the chip pick-up position, is movable in a direction essentially at right angles to the first plane ~~(2)~~, and in the chip bonding position, is movable in a direction essentially at right angles to the second plane ~~(4)~~.

16. (*Currently Amended*) Apparatus according claim 15, characterized in that the transfer assembly ~~(32)~~ comprises a counterweight for each collet ~~(66a-66d)~~, each collet being coupled to its corresponding counterweight through a mechanical coupling for

compensating radial forces exerted on the collet relative to said axis of rotation ~~(10a, 10b, 10c)~~.

17. (*Currently Amended*) Apparatus according to claim 16, characterized in that the mechanical coupling is adapted to be driven by a collet drive motor ~~(79, 83)~~ for moving the collet ~~(66a-66d)~~ radially relative to said axis of rotation ~~(10a, 10b, 10c)~~.

18. (*Currently Amended*) Apparatus according to claim 17, characterized in that the transfer assembly motor has the same axis of rotation ~~(10a-10c)~~ as the collet drive motor ~~(79, 83)~~.

19. (*Currently Amended*) Apparatus ~~according to any of claims 16-18,~~ according to claim 16, characterized in that the counterweight for one collet ~~(66a-66d)~~ is another collet of the transfer assembly ~~(32)~~.

20. (*Currently Amended*) Apparatus according to claim 19, characterized in that said one collet ~~(66a-66d)~~ is situated oppositely relative to said other collet with respect to said axis of rotation ~~(10a, 10b, 10c)~~.

21. (*Currently Amended*) Apparatus ~~according to any of claims 16-20,~~ according to claim 16, characterized in that the mechanical coupling is a wire ~~(72, 74)~~.

22. (*Currently Amended*) Apparatus according to claim 21, characterized in that a support ~~(68a-68d)~~ of each collet ~~(66a-66d)~~ relative to the transfer assembly ~~(32)~~ comprises a pressure spring ~~(70a-70d)~~ pretensioning the wire ~~(72, 74)~~.

23. (*Currently Amended*) Apparatus according to claim 22, characterized in that the pressure spring ~~(70a-70d)~~ has a low stiffness.

24. (*Currently Amended*) Apparatus according to claim 22, characterized in that the pretension force is greater than a bonding force to be applied on a chip ~~(42)~~ on a lead frame ~~(50)~~ by the collet ~~(66a-66d)~~ of a transfer head ~~(14; 40a-40d)~~.

25. (*Currently Amended*) Apparatus according to claim 8, characterized in that the rotatable transfer assembly ~~(32)~~ is rotatable around a transfer assembly stator ~~(100)~~, a narrow circumferential gap ~~(104)~~ being provided between the rotatable transfer assembly ~~(32)~~ and the transfer assembly stator ~~(100)~~, the transfer assembly stator ~~(100)~~ comprising groove sections ~~(106)~~ facing the gap ~~(104)~~ for at least the chip pick-up position and the chip bonding position, respectively, each groove section ~~(106)~~ extending in the circumferential direction and being in communication with a first gas duct ~~(108, 116a-116d, 118a-118d, 120a-120d, 122a-122d)~~, each transfer head of the rotatable transfer assembly ~~(32)~~ comprising at least one collet having a pick-up opening, the pick-up opening being in communication with the gap ~~(104)~~ through a second gas duct ~~(124)~~.

26. (*Currently Amended*) Apparatus according to claim 25, characterized in that the number of groove sections ~~(106)~~ is equal to the number of transfer heads.

27. (*Currently Amended*) Apparatus ~~according to claim 25 or 26,~~ according to claim 25, characterized in that each first duct ~~(108, 116a-116d, 118a-118d, 120a-120d, 122a-122d)~~ is provided with a controllable valve ~~(116e-116g, 118e-118g, 120e-120g, 122e-122g)~~.

28. (*Currently Amended*) Apparatus ~~according to claim 25 or 27,~~ according to claim 25, characterized in that the second gas duct ~~(124)~~ at its end facing the gap ~~(104)~~ is provided with a bridging groove ~~(126)~~ extending in the circumferential direction, the bridging groove ~~(126)~~ being adapted to bridge two adjacent groove sections ~~(106)~~ of the transfer assembly stator (100).

29. (*Currently Amended*) Method according to claim 1, characterized in that the picking up a chip ~~(214)~~ in the chip pick-up position comprises the steps of:

[[-]] (a) positioning a vacuum head ~~(222)~~ holding a carrier film ~~(220)~~ carrying the chip ~~(214)~~, the vacuum head ~~(222)~~ comprising a needle ~~(224)~~ for pushing the chip ~~(214)~~ away from the carrier film ~~(220)~~;

[[-]] (b) positioning a collet ~~(208)~~ opposite to the chip ~~(214)~~;

[[-]] (c) pushing the chip ~~(214)~~ by the needle ~~(224)~~ from the carrier film ~~(220)~~ against the collet ~~(208)~~; and

[[-]] (d) moving the needle ~~(224)~~ away from the chip ~~(214)~~.

30. (*Currently Amended*) Method according to claim 29, characterized in that during step (d) the vacuum head ~~(222)~~ is moved away from the chip ~~(214)~~.